

IMPROVED CLAMSHELL APPARATUS WITH DYNAMIC UNIFORMITY CONTROL

ABSTRACT OF THE DISCLOSURE

5 The present invention includes apparatus and methods for measuring impedance of a layer of deposited metal on a substrate and controlling deposition uniformity during electroplating. A first circuit delivers plating current to a metal layer on the substrate, and a second circuit, electrically isolated from the first, measures the impedance. Methods of the invention provide multi-point sheet resistance measurements before and
10 during an electroplating process on a substrate. In a specific example, resistance is measured via a copper seed layer during electroplating.